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METACOGNITIVE WRAPPERS AS REFLECTION MATERIALS FOR MODULAR APPROACH IN SCIENCE TEACHING

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ABSTRACT

This descriptive-qualitative study determined the metacognitive wrappers as reflection materials for modular approach in Science teaching. It was found that the different factors to be considered when drafting metacognitive wrappers are the cognitive level of learners, relevance to the topic, encouragement of engagement, time element, and evaluation and feedback. Science teachers' validation of metacognitive wrappers in terms of activities includes clarity and structure, relevance, and engagement. Assessment includes the need for pre-assessment, activities during assessment, the need for post-assessment, and results analysis. Analysis includes the identification of strategies, effectiveness of those strategies, plans for improvement, and instructional teaching adjustments. The experts validated, in terms of activities, that include learning objectives alignment, target audience, specificity, and integration with the curriculum. Assessment includes reflective prompts; it must be simple and manageable, process-oriented reflection, and feedback mechanisms. Analysis includes metacognitive strategies, real-world application, differentiation, and evaluation and revision.

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Keywords: *Metacognitive Wrappers, Reflection Materials, Modular Approach, Science Teaching*

INTRODUCTION

The emergence of the COVID-19 pandemic in early 2020 brought significant challenges to the global education sector, interrupting conventional teaching and learning methods. As schools adapted to remote and hybrid learning formats, both educators and students faced a range of difficulties. Students struggled with diminished direct interaction with teachers, restricted access to educational resources, and differing degrees of technological skills, which often worsened pre-existing educational inequalities.

As a teacher-researcher who observed the challenges faced by students during the pandemic, it became essential to investigate innovative strategies to enhance science education during these unpredictable times. The idea of metacognitive wrappers surfaced as a viable solution. These are additional learning resources that help students develop their metacognitive skills by encouraging them to reflect, set goals, monitor, and evaluate their learning strategies (Hacker, Dunlosky, & Graesser, 2009).

Moreover, the teacher-researcher's over seven years of experience highlights the necessity of addressing the diverse needs of learners and the learning difficulties that were intensified by the pandemic.

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Metacognitive wrappers provide a systematic method for assisting students in independently managing intricate scientific material, thereby fostering self-directed learning and resilience during educational disruptions. This study aims to investigate and validate the effectiveness of metacognitive wrappers as a teaching tool in science education, especially in improving students' metacognitive awareness and academic performance in light of the challenges brought by the pandemic. By focusing on learner needs and applying metacognitive strategies specific to science learning environments, the research intends to offer valuable insights and practical recommendations for educators seeking to adapt and innovate within the changing educational landscape.

Originally introduced by Marsha Lovett in 2013, metacognitive wrappers present a promising strategy to enhance learning. They promote self-regulation and reflection, guiding students to establish goals, track their progress, and modify their approaches as needed. As recommended by Davis et al. (2020), incorporating metacognitive wrappers as reflection tools can equip students with the necessary support to overcome the difficulties of modular learning and encourage a deeper understanding of the material.

Incorporating metacognitive wrappers into the modular approach, as envisioned by this study, aligns with the research by McCabe (2024): "All 'Wrapped' Up in Reflection: Supporting Metacognitive Awareness to Promote Students' Self-Regulated Learning."

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MATERIALS AND METHODS

Research Methodology

This chapter presents the research method, research design, participants of the study, data-gathering procedures, research instrument, and data analysis used in this study. The purpose of this study was to determine the factors that would be considered in crafting metacognitive wrappers to be used as reflection materials for modular approach in science teaching.

Research Method

The research method utilized in this study was descriptive-qualitative employing questionnaire and in-depth interviews.

The ten (10) Science teacher- participants were provided with an interview schedule that included several questions for them to answer during an interview session with the researcher about factors to consider when crafting the metacognitive wrapper as reflection materials for a modular approach to science teaching. During the interview, the interviewees were allowed to sit down and think about the questions regarding the study. The aim of the interview was to gather the main or the important insights of the participants on the different factors that they may consider in drafting metacognitive wrappers. Afterward, eight (8) Science experts validated the metacognitive wrappers created by the researcher as a result of the interviews with the teacher-participants.

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Research Design

The research design utilized in this study was phenomenology and content analysis.

Phenomenology is a methodological approach that focuses on describing and interpreting the meanings that individuals ascribe to their experiences. Researchers using phenomenology engage deeply with participants' narratives to identify common themes, patterns, and structures that underlie their experiences (Creswell, J. W., 2013).

Participants of the Study

The participants of the study were 10 Science Teachers teaching in junior high school. Five (5) of them were from the Schools Division of Iloilo City and five (5) also came from the Division of Iloilo. Another set of participants included 8 science experts all from the Schools Division of Iloilo City and the Division of Iloilo.

Research Instrument

The research instrument utilized in this study was a questionnaire and a researcher-made interview schedule. The questionnaire consists of twelve (12) items which represent different factors in validating metacognitive wrappers. These items are categorized in terms of activity, assessment, and analysis while the interview schedule contains three (3) questions.

Audio and video recorders were also used for data gathering and documentation, depending on the permission of the participants.

Validity of the Research Instrument

Prior to the determination of the validity of the questionnaire and interview schedule made by the researcher, the adviser, Dean of the Graduate School, then a panel of jurors who

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were considered for their expertise in the fields of research, testing and assessment, and English, submitted each question for review and modification.

Validity refers to the extent to which a concept, conclusion, or measurement is well-founded and corresponds accurately to the real world. It is an assessment of how accurately a study reflects or assesses the specific concept that the researcher is attempting to measure.

Validity is the degree to which the instrument measures what it purports to measure (Kimberlin & Winterstein, 2008).

Comments, corrections and suggestions from the panel of validators regarding the questionnaire and interview schedule were considered using the appropriate form of Good and Scates (Appendix B).

Data Gathering Procedures

Permits from the adviser, Dean of the Graduate School, heads of offices, and individual participants were obtained to allow the researcher to conduct the study. The researcher personally visited the schools, communities or other locations convenient for the participants to conduct the study; if not allowed, google form and virtual interview were used.

The researcher conducted an interview with the participants, but prior to this, the researcher first encouraged the participants to sign a waiver or permission related to the conduct of the study.

Using in-depth interviews, a voice and video recorder was provided to completely capture the interviewee's words. The participants were allowed to sit one after the other at a considerable distance with the researcher to provide responses to the questions. The objective

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was to gather the respondents' views about the study. The researcher consolidated all the data collected after the series of interviews.

Data Analysis

The information gathered during the interview was analyzed using a thematic approach.

Thematic analysis is a method for identifying, analyzing, and reporting patterns (themes) within data. It minimally organizes and describes your data set in rich detail. It organizes and describes your data set in rich detail" (Braun & Clarke, 2019).

RESULTS AND DISCUSSIONS

The study determined the factors that will be considered in crafting metacognitive wrappers as reflection materials for Science teaching.

The research method utilized in this study was descriptive, using a questionnaire and in-depth interviews.

This study employed a descriptive-survey design for quantitative research and phenomenology under qualitative research design.

A descriptive survey is a methodological approach within descriptive research that involves collecting data from a sample to systematically describe the characteristics of a larger population. It focuses on gathering information about the status or conditions of the subject of study (Babbie, E., 2016).

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Phenomenology is a methodological approach that focuses on describing and interpreting the meanings that individuals ascribe to their experiences. Researchers using phenomenology engage deeply with participants' narratives to identify common themes, patterns, and structures that underlie their experiences (Creswell, J. W., 2013).

This study was limited to 10 Science Teachers and 8 Science Experts, all from the Division of Iloilo City and the Division of Iloilo. The ten (10) Science teacher-participants were provided with an interview schedule incorporating several questions for them to answer during an interview session with the researcher regarding factors that can be considered in crafting the metacognitive wrapper as a supplemental learning material for a modular approach to science teaching. During the interview, the interviewee was allowed to sit down and think about the questions related to the study. The aim of the interview was to gather the main or important insights of the participants on the different factors that were considered in drafting the metacognitive wrappers. Afterward, eight (8) Science Experts validated the metacognitive wrappers created by the researcher based on the results of the interviews with the teacher-participants.

The research instruments utilized in this study were a questionnaire and a researcher-made interview schedule. Audio and video recorders were also used for data gathering and documentation, depending on the permission of the participants.

The research instruments utilized in this study were questionnaires and a researcher-made interview schedule.

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Audio and video recorders were also used for data gathering and documentation depending upon the permission of the participants.

A panel of experts validated both the questionnaire-checklist and the interview schedule. The researcher considered all comments and suggestions related to the validation of the tools.

Permits from the adviser, the Dean of the Graduate School, heads of offices, and individual participants were obtained to allow the researcher to conduct the study. The researcher personally visited the schools/community/place convenient for the participants to conduct the study; if this was not allowed, a Google Form and virtual interview were utilized.

The information gathered was analyzed and interpreted using a thematic approach for the interview schedule and content analysis to validate the metacognitive wrappers.

The following are the findings of the study: Based on the results of the interviews with the participants, it was found that the different factors to be considered in drafting metacognitive wrappers are the cognitive level of learners, relevance to the topic, encouragement of engagement, time element, and evaluation and feedback.

It was found that science teachers' validation of metacognitive wrappers in terms of activity includes clarity and structure, relevance, and engagement.

It was also found that science teachers' validation of metacognitive wrappers in terms of assessment includes the need for pre-assessment, activities during assessment, the need for post-assessment, and results analysis.

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Likewise, science teachers' validation of metacognitive wrappers in terms of analysis includes the identification of strategies, effectiveness of strategies, plans for improvement, and instructional adjustments.

Based on the results of the analysis conducted by the experts on the metacognitive wrappers in terms of activity, it was found that the activity includes learning objectives alignment, target audience, specificity, and integration with the curriculum.

It was found that the assessment includes reflective prompts; it must be simple and manageable, process-oriented reflection, and a feedback mechanism.

It was also found that the analysis includes metacognitive strategies, real-world application, differentiation, and evaluation and revision.

Based on the findings, the following insights were drawn:

Teaching aids known as metacognitive wrappers encourage critical thinking and self-reflection, helping learners gain skills and information for lifetime learning. They promote in-depth comprehension, self-regulated learning, and active interaction with the learning materials.

Metacognitive wrappers highlight how crucial it is to incorporate self-reflective questions, challenges, strategies, and performance adjustments into education through metacognitive wrapping. It is important for learners to participate in journaling, self-reflection exercises, and group discussions.

For learners to learn on their own, metacognitive wrappers recommend presenting important concepts and pre-assessments prior to learning activities. To help learners identify

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areas for development and adjust their teaching strategies based on performance and learning experiences, reflective evaluation is essential to teaching and learning.

Using metacognitive processes is important in practical contexts for assessing competency. Enhancing learners' learning strategies requires metacognitive wrapping. Analytical and critical thinking skills are improved through reflective learning and can be applied in everyday situations. It encourages learners to plan for growth and build metacognitive strategies.

Metacognitive wrappers are customized to fit the requirements of various learners in science instruction. These wrappers support introspective and lower order thinking skills, improve learning processes, and align with SMART learning objectives.

By allowing learners to select prompts according to their interests, process-based evaluation, scientific methods, and metacognitive frameworks, metacognitive wrappers enhance learning. They promote problem-solving, teamwork, and assessment of instructional strategies. Metacognitive wrappers support learners' development of higher-order thinking skills and help them monitor their progress in learning. Through the integration of fields and cognitive patterns, they improve knowledge, engagement, and academic accomplishment. Lesson wrappers assess understanding and problem-solving skills using tools and reflection logs.

CONCLUSION

In light of the findings and insights made in this study, the following recommendations are forwarded:

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Metacognitive wrappers must be easy to use, arranged neatly, and pertinent to the lesson content. The dissemination of course material should be given top priority, and self-reflection, understanding tracking, and progress evaluation should all be included.

There is a need to assess metacognitive wrappers to ensure they include challenging questions and align with the course objectives. It is also recommended to employ methods to aid in learning, such as games, surveys, and graphs.

To assess learners' and teachers' metacognitive wrapping, rubric must be developed that emphasizes deep comprehension, applicability to learning objectives, identification of strategies, and suggestions for growth.

To make metacognitive wrappers more effective and aligned with the learning objectives of each unit or module, feedback is essential.

To promote critical thinking and self-evaluation in learners' learning processes, the study recommends incorporating reflective prompts into assessment designs.

Metacognitive wrappers must be introduced in training sessions, seminars, In-service training, School Learning Cells, and other professional development activities of teachers.

Copies of these metacognitive wrappers must be introduced to the School Districts, Schools Division of Iloilo City Office, and Regional Office for their comments and suggestions.

These metacognitive wrappers must first be utilized by science teachers in their respective classrooms then extended to other schools within the Schools District of Jaro IV-A.

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To measure the effectiveness of the metacognitive wrappers, it is highly recommended to determine its level of importance and acceptability using appropriate tools and statistical analysis.

A similar study is also encouraged to be conducted in the future and considering other variables not used or mentioned in this study.

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